This constant temperature of the surface having been once established, the internal parts would be hotter than the crust, and their heat must then necessarily, by the law of conduction, pass from the hotter to the cooler region, and so into and through the crust, and be radiated away from the surface into space, the kind of action which I illustrated in my former letter by the dispersion of a crowd. Thus the interior would tend to fall to the already established temperature of the surface, and thenceforth tend to cool more rapidly than the "crust." For the nearer a stratum lies to the surface, the less cooling will be requisite to bring it down to the temperature of the surface. To take the extreme case; after the lapse of an infinite time the whole globe would eventually become of the temperature which the surface assumed at that already far-distant epoch, and has maintained ever since.

When the superficial strata had early assumed their nearly permanent temperature, they will concomitantly have attained a corresponding permanent volume, which will afterwards have proved too large for the cooling interior, so that they must, in subsiding, have become wrinkled. To this extent, then, I think Mr. Wallace's objections are untenable. Here, however, enters the question, so difficult to answer in nearly all geological problems, of "How much?" For my part, I think I have proved that the mere cooling, though a *vera causa*, would not be of itself a sufficient cause to account for the inequalities existing now, at what must be, judging by the enormous store of heat still within the earth, a comparatively early stage of the cooling.[1] O. FISHER

Harlton, Cambridge, January 18

Leibnitz's Mathematics

IN NATURE, vol. xix. p. 196, I see there is a letter respecting the claims of Newton and Leibnitz to the discovery of the differential calculus. In view of any future discussion of this matter it seems to me that the following extract from a letter of Leibnitz to James Bernoulli is worth the consideration of the advocates of both claimants:—

"Ego qui semper hoc habui eximium, ut essem mortalium docillimus, sæpeque luce ex unius magni viri verbis pauculis hausta innumera mea meditata nondum matura delevi; statim arripere monita summi mathematici."—Ex epistola Leibnitii ad Jac. Bernoullium, April, 1703, data.

The sense of this passage may, I think, be fairly rendered into English as follows:—

"I [am one] who ever regarded this as most important, that I should be most apt of mortals to receive instruction, and frequently light having been drawn from a very few words of a great man, my countless meditations not yet ripened I have blotted out forthwith to seize upon the hints of the most eminent mathematician." JAMES BOTTOMLEY

Lower Broughton, near Manchester, January 13

I HOLD myself prepared to make good my own assertions, and to respond to Mr. A. B. Nelson's call as soon as I know whether Prof. Tait has abandoned his position, or, if not, what he has to say in justification of his proceeding in denying Leibnitz to be a mathematician and affirming him to be a thief.

I am sure the editor will allow me to reply to his postscript. It is certainly not to be presumed, as a matter of course, that when Prof. Tait "lets pass such a challenge he has given up his point." But I do insist upon it that this "hard-worked scientist" had no right to pass it by after having provoked it. He put himself in the wrong, and I left him there.

But as to this being a question of merely "antiquarian interest," I take leave to deny it. I revere the name and intellect of Leibnitz, and I, for one, have a human interest in clearing that name from a foul slander. Nor should we pass by the main issue to discuss the collateral question which the editor raises in respect of Gregory's series. C. M. INGLEBY

Valentines, Ilford

German Degrees

IT having come to the certain knowledge of the Faculty of Philosophy in the University of Erlangen that a fraudulent trade is carried on in England under a pretence of procuring doctor diplomas of the said Faculty, I consider it in the interest of the public hereby to make it known that promotions *in absentia* are not conferred in that faculty, and that no one in England, or elsewhere, is, or has ever been, authorised to confer or negotiate for the conferring of such diplomas.

E. LOMMEL,
Dean of the Faculty of Philosophy,
University of Erlangen, Bavaria

Erlangen, January 14

Feeding a Python

THE following details of a recent attempt to feed a python now at the Raffles Museum, Singapore, may be of interest as upsetting previous ideas as to the certainty of that reptile's attack:—

The python in question is a fine specimen caught on the island, for the sake of the reward given by the police in such cases, and measures about 22 feet in length. It has been in my charge for about two and a half months, during which time it has not been fed. About ten days since it commenced casting its skin, and, as is usual after that proceeding, was unusually lively, snapping at a stick put into the cage, and in one or two instances narrowly missing the attendant's hand. The reptile, I should mention, escaped from its cage just before casting, but having taken refuge beneath some odds and ends of timber near the museum, was recaptured without difficulty, and was then placed in a cage about 5 feet square every way.

A pariah dog having been obtained, it was introduced, muzzled, into the cage, the muzzle being then slipped. While entering, the snake struck twice at the dog's hind-quarters, but without seizing it. The dog crept into a corner and sat down. Two or three more blows were then made by the snake, but, as before, without gripping, and the dog was then seen to have been struck by the teeth on the fore-quarters, the punctures slightly bleeding. *For nine successive times* the snake struck at the dog with the same ill-success, and as it was then growing dark, the shutter of the cage was closed. Early next morning the snake was found coiled round the dog, which it had killed and commenced to swallow; but a Malay attendant having touched the python with a rod, it untwined itself and retreated to a corner of the cage, refusing to again touch its prey.

I may be misinformed, but have always understood that snakes of the python or boa tribe seldom renew their attacks if the first fails; and I shall be glad if you can direct me to any published experience on the subject. The python in question is a male.

Singapore, November 25, 1878 N. B. D.

Shakespeare's Colour Names

I FEAR it would be somewhat rash to convict Shakespeare of colour-blindness, or even vagueness in the use of colour-names, solely on the evidence of the Nurse in "Romeo and Juliet"—a lady who is the Mrs. Malaprop of the play, and whose extraordinary faculty for the confusion of terms may perhaps have contributed somewhat to the "merriness" with which she credited her husband. It is possible that the Nurse—in the passage quoted by Mr. J. J. Murphy (NATURE, vol. xix. p. 197)—meant to convey the idea of a *hazel* eye, which would not be far removed in colour from that of an eagle, but also often has a slight tendency to a greenish hue. The nurse, not being particular as to the precision of her descriptions in general, refers to it as green.

It is likely besides that Shakespeare deliberately intended the incongruity, just as in the "Midsummer Night's Dream" he makes the bumpkin who acts Thisbe in that piece of "very tragical mirth," *Pyramus and Thisbe*, lament

> "Those lily brows,
> This cherry nose,
> These yellow cowslip cheeks,
> . . . . . .
> *His eyes were green as leeks.*"

This passage indeed shows that Shakespeare knew perfectly well the chromatic meaning of green.

A very cursory glance through Shakespeare will show innumerable lines where colours are referred to in their true and exact sense.

Here are a few passages selected with special reference to the colours green and blue.

Prospero's description of the witch Sycorax:—

> "This blue-eyed hag."—*Tempest*, i. sc. 2.

(The ideal Scandinavian witch.)

---

[1] Cambridge *Phil. Trans.*, vol. xii. part 2.

© 1879 Nature Publishing Group

"... white and azure, laced
With blue of heaven's own tint."
Cymbeline, ii. sc. 2.

"Whose ranks of blue veins."—*Lucrece*.

"Those blue-veined violets."—*Venus and Adonis*.

"Where fires thou find'st unraked, and hearths unswept
There pinch the maids as blue as bilberry."
Merry Wives of Windsor, v. sc. 5.

"And *Hony soit qui mal y pense* write
In emerald tufts, flowers purple, blue, and white,
Like sapphire, pearl, and rich embroidery."—*Ibid.*, v. sc. 5.

Here there is no confusion. The comparisons are exact and beautiful. Again we have—

"When wheat is green, when hawthorn buds appear."
Midsummer Night's Dream, i. sc. 1.

The season indicated shows there was no confusion between green and *brown*.

We must not forget the well-known song—

"When daisies pied and violets blue,
And lady-smocks all silver white,
And cuckoo-buds of yellow hue
Do paint the meadows with delight."
Love's Labour Lost, v. sc. 2.

And to conclude our comparisons of green and blue—

"... I will rob Tellus of her weeds
To strew thy green with flowers: the yellows, blues,
The purple violets, and marigolds,
Shall as a chaplet hang upon thy grave."
Pericles, iv. sc. 1.

Returning to the colour of eyes. Shakespeare not only knew a blue eye, but could discriminate, and appreciate the beauty of a grey eye—a shade which often does duty for blue. The lovely rivals Julia and Sylvia are so endowed—

"Her eyes are grey as glass—and so are mine."
Two Gentlemen of Verona, iv. sc. 4.

"... Thisbe, a grey eye or so."
Romeo and Juliet, ii. sc. 4.

I think the above quotations afford good proof of the poet's correctness of colouring with regard to green and blue. It is true that he occasionally uses a small degree of licence with purple and blue, in the case of violets; but clearly not from unconsciousness of the difference. I cannot remember any instance where he confuses green with blue except purposely and humorously.

In the use of other colours Shakespeare is in most instances I am acquainted with equally true to nature. To give examples would occupy too much space; but if there are exceptions I have no doubt that your correspondents—now that the matter is broached—will be able to furnish them.

Sligo, January 10 EDWARD T. HARDMAN

Intellect in Brutes

THE following incident may interest some of the readers of NATURE, as affording evidence of the possession and exercise of reasoning power by a brute. During the present frost the window-sills of my drawing-room are supplied with bread for the benefit of the birds, who, finding food there, are constantly fluttering about the windows. One day a large water-rat was seen on the window-sill, helping himself to the bread. In order to reach the window he had to climb to a height of about thirteen feet: this he did by the help of a shrub trained against the wall. Neither instinct nor experience will easily account for his conduct: since he never found food there before. If neither experience nor instinct, what save reason led him? His action seems to have been the result of no small observation and reasoning. He seems to have said to himself—I observe the birds are thronging that window all day; they would not be there for nought; it may be they find there something to eat: if so, perhaps I too might find there something which I should like. I shall try.

Bardsea EDWARD GEOGHEGAN

OUR ASTRONOMICAL COLUMN

OLBERS' COMET OF 1815.—On March 6, 1815, Olbers discovered a small comet at Bremen, in about 49° right ascension, and 32° north declination, or between Perseus and Musca; it had an ill-defined nucleus and was not visible without telescopic aid. The first parabolic elements were calculated by Olbers himself, and he was followed by Bessel, Gauss, Triesnecker and others in the determination of similar orbits. Ephemerides founded upon them showed that the comet would be observable for a considerable period, and as the result proved observers were not negligent of this circumstance. Gauss, writing to Bode on April 24, alludes to the long visibility of the comet, and the probability that elliptical elements would be found, but this remark apparently was merely intended to imply that the grasp which a long course of observation would afford upon the orbit, might lead to an ellipse, not that Gauss had remarked any sensible deviation from parabolic motion; indeed he mentions that he had not then reduced his April observations. The first detection of the inadequacy of the parabola to represent accurately the comet's course, is due to Bessel: he had calculated parabolic elements from observations on March 11, April 11, and May 20, which, while agreeing well with the positions employed, gave the right ascensions sensibly too small from March 11 to April 11, and between April 11 and May 20, as decidedly too great, even to as much as 4′, and on May 26, the calculation was again many minutes in defect; these differences naturally induced Bessel to relinquish the parabolic hypothesis, and after some disappointment from the failure of the first method he employed, he communicated to Olbers on June 23 the elements of an elliptical orbit, in which the period of revolution was a little over 73 years. At the end of June Gauss deduced an ellipse with a period of 77 years, and soon afterwards Nicolai, then assistant to von Lindenau at Gotha, added a further confirmation of the elliptical character of the orbit, assigning a revolution of 72½ years. On July 22, being in possession of observations to the middle of the month, Bessel improved upon his first calculation, and now found an ellipse with a period of 73·8968 years, which was made the foundation for his subsequent investigations, of which we have presently to speak. Thus was the periodicity of the comet established, and Bessel, after remarking upon the importance of the addition to the system (at that time Halley's comet was the only one that could be considered certainly periodical) he proposed that it should bear the name of its discoverer—Olbers.

Besides a long series of observations taken by Olbers himself, the comet was observed by Gauss at Göttingen, Bessel at Königsberg, Triesnecker at Vienna, Struve at Dorpat, Oriani at Milan, Lindenau at Gotha, Maskelyne at Greenwich, and Bouvard at Paris. Its distance from the earth continued pretty nearly constant (about 1·45) during the greater portion of the time it was visible, and at no period was it a conspicuous object; its nucleus was pretty bright at the beginning of May, and it then had a tail about 1° in length.

On the disappearance of the comet Bessel collected the observations which extended to August 25, the last having been made by Gauss at Göttingen; indeed, he was the only observer after July 25. He then commenced the work which is incorporated in his great memoir upon this comet, published in "Abhandlungen der königlichen Akademie der Wissenschaften in Berlin, 1812–13," a volume which was not published until 1816. He formed ten normal positions, in which all the observations appear to be brought to bear, excepting those at Greenwich and Paris, which were doubtless unknown to him. He corrects these normals for the effect of perturbations from the action of Venus, the Earth, Mars, Jupiter, and Saturn, during the comet's visibility, and by a fine series of observations of the sun at Königsberg between March 8 and August 29, 1815, he applies corrections to the sun's places obtained from Carlini's first tables. Equations of condition were then formed and solved on the method of least squares, and thus the following definitive elements of the comet's orbit in 1815 were obtained:—

© 1879 Nature Publishing Group